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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,095	08/26/2005	Michail Tsatsanis	VOY-025US	1121

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EXAMINER
CHAN, SAI MING

ART UNIT	PAPER NUMBER
2616	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
	10/517,095	TSATSANIS ET AL.
Office Action Summary	Examiner	Art Unit	
	Sai-Ming Chan	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>*3*</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>*26 August 2005*</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>*06 December 2004*</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>*8/26/2005 and 6/19/2007*</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 8/26/2005 and 6/19/2007 have

been considered by the Examiner and made of record in the application file.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 43 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by **Redferm**

(U.S. Patent Publication # 20020163983).

Consider **claim 43**, Redferm clearly discloses and shows a method of processing a received DMT symbol that is preceded by a prefix (paragraph 0027 (prefix)) and does not include a suffix (paragraph 0027 (prefix and DMT symbols)), the method comprising: extracting a last portion of a prefix symbol (paragraph 0027 (last W samples)); shaping a prefix with a prefix window (paragraph 0027 (window)) to create a shaped prefix; shaping a DMT symbol that does not include a suffix (paragraph 0027 (prefix and DMT symbols)) with a DMT window (paragraph 0027 (received DMT symbols multiplied by 1-w(n))) to create a shaped DMT symbol; and combining the shaped DMT symbol and the shaped prefix (paragraph 0027 (adding prefix and DMT)).

Consider **claim 44**, Redferm clearly discloses and shows a method of processing a received DMT symbol that has not been windowed for transmission (paragraph 0034 (without windowing)), the method comprising: extracting a last portion of a prefix symbol (paragraph 0027 (last W samples)); shaping a prefix with a prefix window (paragraph 0027 (window)) to create a shaped prefix; shaping a DMT symbol that has not been windowed for transmission with a DMT window (paragraph 0027 (received DMT symbols multiplied by 1-w(n))) to create a shaped DMT symbol; and combining the shaped DMT symbol and the shaped prefix (paragraph 0027 (adding prefix and DMT)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459

(1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating

obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c)

and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 8, 10-15, 22, 24-29, 36 and 38-41 are rejected under 35 U.S.C.

103(a) as being unpatentable over Erving et al. (U.S. Patent Publication #

20020154716), in view of Nedic et al. (U.S. Patent # 6563841).

Consider claims 1, 15 and 29 Erving et al. clearly disclose and show a method,

comprising: designing a TEQ (Time EQualizer) (paragraph 0058 (design a TEQ)) in a

DMT (Discrete Multi-Tone) system (paragraph 0017 (TEQ filter in a DMT-based

modem)) to improve throughput performance (paragraph 0058 (improvement in

performance and throughput)); and reducing (paragraph 0058 (design a TEQ with

minimal residual ISI)) the number and severity that the TEQ introduces (paragraph 0058

(residual isi results in noise)) in a transfer function of a shortened main channel (fig. 5,

paragraph 0033 (shortening the channel is referred to as TEQ)) in the DMT system.

However, Erving et al. do not specifically disclose notches.

In the same field of endeavor, Nedic et al. clearly show notch reduction (column

13, lines 24-36 (equalization technique with adaptive notching)).

Therefore, it would have been obvious to a person of ordinary skill in the art at

the time of invention to incorporate a TEQ design, as taught by Erving, and demonstrate

notch reduction, as taught by Nedic et al., so that the DMT network can function

efficiently.

Consider **claims 8, and as applied to claim 1 above,**

claims 22, and as applied to claim 15 above,

claims 36, and as applied to claim 29 above,

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

the TEQ design is used in a multiline communications system (paragraph 0004 (DMT))

having multiple twisted copper pairs (paragraph 0014 (twisted pair copper wires)) as a

single multiline communications channel, and physical-layer signals (paragraph 0015

(pulse(symbol))) coordinated across multiple transmitters and/or across multiple

receivers for the purpose of minimizing (paragraph 0017 (minimize ISI)) interference

noise from external sources (paragraph 0014 (ISI and ICI)), such as crosstalk noise

from other high-bitrate services (paragraph 0002 (DSL and ISI dispersion)) operating in

a common binder or adjacent binders.

Consider **claims 10, and as applied to claim 8 above,**

claims 24, and as applied to claim 22 above,

claims 38, and as applied to claim 36 above,

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

designing the TEQ further comprises using a MSSNR (Maximum Shortening Signal-to-

Noise Ratio) method (paragraph 0020 (maximum SSNR)).

Consider **claims 11, and as applied to claim 8 above,**

claims 25, and **as applied to claim 22 above,**

claims 39, and **as applied to claim 36 above,**

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein designing the TEQ further comprises using a MinISI (Minimum Inter-Symbol Interference) method (paragraph 18 (TEQ to minimize ISI)).

Consider **claims 12,** and **as applied to claim 8 above,**

claims 26, and **as applied to claim 22 above,**

claims 40, and **as applied to claim 36 above,**

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein the eigenvector used to compute the TEQ filter coefficients does not correspond to a maximum eigenvalue (paragraph 0017 (optimal TEQ with smallest eigenvalue and eigenvector)).

Consider **claims 13,** and **as applied to claim 8 above,**

claims 27, and **as applied to claim 22 above,**

claims 41, and **as applied to claim 36 above,**

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein selecting the eigenvector comprises maximizing the achievable bitrate (paragraph 0004 (DMT is used on DSL which provides high speed communication)) over a subspace of eigenvectors.

Consider **claims 14,** and **as applied to claim 8 above,**

          claims 28, and **as applied to claim 22 above,**

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of

eigenvalues that are comparable in magnitude to a maximum eigenvalue (paragraph

0059 (repeated iterations resulted in the eigenvector corresponding to the largest

eigenvalue)).

Claims 2-7, 9, 16-21, 23-24, 30-35 and 37 are rejected under 35 U.S.C.

103(a) as being unpatentable over **Erving et al. (U.S. Patent Publication #**

20020154716), in view of **Nedic et al. (U.S. Patent # 6563841),** and in view of

Amrany et al. (U.S. Patent #6999504)

Consider **claims 2,** and **as applied to claim 1 above,**

          claims 9, and **as applied to claim 8 above,**

          claims 16, and **as applied to claim 15 above,**

          claims 23, and **as applied to claim 20 above,**

          claims 30, and **as applied to claim 29 above,**

          claims 37, and **as applied to claim 36 above,**

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

designing the TEQ comprises selecting an eigenvector (fig. 6, paragraph 0036

(eigenvector)); and computing TEQ filter coefficients with the eigenvector (paragraph

0038 (use eigenvector and eigenvalues to generate the coefficients)).

However, Erving et al., as modified by Nedic et al., do not specifically disclose

subspace-based design.

In the same field of endeavor, Amrany et al. clearly show subspace-based

design (column 12, lines 52-58 (subspace); column 14, lines 35-39 (vector can be

estimated)).

Therefore, it would have been obvious to a person of ordinary skill in the art at

the time of invention to incorporate a TEQ design, as taught by Erving, and demonstrate

subspace-based design, as taught by Amrany et al., so that the DMT network can

function efficiently.

Consider **claims 3, and as applied to claim 2 above,**

claims 17, and as applied to claim 16 above,

claims 31, and as applied to claim 30 above,

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

designing the TEQ further comprises using a MSSNR (Maximum Shortening Signal-to-

Noise Ratio) method (paragraph 0020 (maximum SSNR)).

Consider **claims 4, and as applied to claim 2 above,**

claims 18, and as applied to claim 16 above,

claims 32, and as applied to claim 30 above,

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

designing the TEQ further comprises using a MinISI (Minimum Inter-Symbol

Interference) method (paragraph 18 (TEQ to minimize ISI)).

      Consider **claims 5, and as applied to claim 2 above,**

            claims 19, and as applied to claim 16 above,

            claims 33, and as applied to claim 30 above,

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

the eigenvector used to compute the TEQ filter coefficients does not correspond to a

maximum eigenvalue (paragraph 0017 (optimal TEQ with smallest eigenvalue and

eigenvector)).

      Consider **claims 6, and as applied to claim 2 above,**

            claims 20, and as applied to claim 16 above,

            claims 34, and as applied to claim 30 above,

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein

selecting the eigenvector comprises maximizing the achievable bitrate (paragraph 0004

(DMT is used on DSL which provides high speed communication)) over a subspace of

eigenvectors.

      Consider **claims 7, and as applied to claim 6 above,**

            claims 21, and as applied to claim 16 above,

claims 35, and **as applied to claim 30 above,**

Erving et al., as modified by Nedic et al., clearly disclose and show a method, wherein the subspace of eigenvectors has a basis of eigenvectors corresponding to a set of eigenvalues that are comparable in magnitude to a maximum eigenvalue (paragraph 0059 (repeated iterations resulted in the eigenvector corresponding to the largest eigenvalue)).

Conclusion

Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to**:

> Commissioner for Patents
> P.O. Box 1450
> Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

> Customer Service Window
> Randolph Building
> 401 Dulany Street
> Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Sai-Ming Chan whose telephone number is (571) 270-1769. The Examiner can normally be reached on Monday-Thursday from 6:30am to 5:00pm.
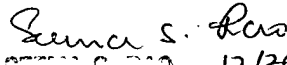
If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Seema Rao can be reached on (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 571-272-4100.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

Sai-Ming Chan
S.C./ sc

December 16, 2007

Seema S. Rao   12/26/07
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600